TELECOMMUNICATIONS

XSRING
Failsafe SHDSL Switch

User's guide

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The XSRING failsafe ring SHDSL switch is manufactured by

ETIC TELECOM

13 Chemin du vieux chêne
38240 MEYLAN
FRANCE

TEL : + 33 4-76-04-20-00
FAX : + 33 4-76-04-20-01
e-mail : contact@etictelecom.com
web : www.etictelecom.com

Hotline
TEL : + 33 4-76-04-20-05
FAX : + 33 4-76-04-20-01
e-mail : hotline@etictelecom.com

OVERVIEW

1 PRODUCTS IDENTIFICATION....6
2 PRODUCT OVERVIEW....7
2.1 Function....7
2.2 Shdsl operations....7
2.3 Ethernet ports....8
2.4 VLAN....9
2.5 Quality of service....9
2.6 Serial gateway....9
2.7 Diagnostic functions....9
2.8 Html or DIP switches configuration....9
3 DATA SHEET....10

INSTALLATION

1 PRODUCT DESCRIPTION....11
1.1 Leds....12
1.2 Connectors....13
1.3 DIP switches and pus-button....15
2 VENTILATION....16
3 SUPPLY VOLTAGE....16
4 FUSE....16
5 ETHERNET PORTS....16
6 RS232 (XSRING-2220 AND XSRING-2230)....17
7 RS485 (XSRING-2230)....17
8 SHDSL LINE....18
9 INPUT AND OUTPUT....20

./..

DIP SWITCHES CONFIGURATION

1 OVERVIEW 21
2 DIP SWITCHES CONFIGURATION 21
2.1 Enabling DIP switches configuration 21
2.2 SHDSL port 1 configuration (SW3, SW4, SW5) 21
2.3 SHDSL network topology DIP switches (SW6, SW7) 22
2.4 SHDSL port 2 configuration 23
3 TESTING THE SHDSL CONNECTION AND ADJUSTING THE DATA RATE 23
4 TESTING THE FAILSAFE RING 23

HTML CONFIGURATION

1 SET UP STEPS 25
2 ENABLING HTML CONFIGURATION 26
3 CONNECTING A PC TO THE XSRING FOR CONFIGURATION 26
3.1 Overview 26
3.2 First configuration 27
3.3 Modifying the configuration from the LAN 28
4 REBOOTING THE XSRING AFTER PARAMETERS CHANGES 28
5 RECOVERING THE FACTORY LAN IP ADDRESS 28
6 RECOVERING THE FACTORY CONFIGURATION 29
7 RESTRICTING ACCESS TO THE ADMINISTRATION SERVER 29
8 RECOVERING A FREE ACCESS TO THE ADMINISTRATION SERVER 29
9 ASSIGNING AN IP ADDRESS TO THE LAN INTERFACE 30
10 IP ROUTING AND BROADCAST FILTERING 30
11 MULTIDROP NETWORK SET UP 33
11.1 Set up 33
11.2 Testing the SHDSL connection and adjusting the data rate 34
12 4,6 MB/S POINT TO POINT CONNECTION SET-UP 35
12.1 Overview 35
12.2 SHDSL port set-up 35

./..

… HTML CONFIGURATION

13 FAILSAFE RING SET UP 36
13.1 Overview 36
13.2 SHDSL port set up 37
13.3 Setting up a failsafe ring using the ETIC ring 38
13.4 Setting up a failsafe ring using STP 38
13.5 Testing the SHDSL connection and adjusting the data rate 38
13.6 Checking the RING function 39
14 VLAN SET UP 40
14.1 Overview 40
14.2 VLAN set up 42
15 QUALITY OF SERVICE (QOS) SET UP 43
15.1 DiffServ benefits & overview 43
15.2 QoS set up 44
16 SNMP SET UP 46
17 SERIAL GATEWAYS 47
17.1 « Modbus » gateway 48
17.2 RAW TCP gateway 53
17.3 RAW UDP gateway 56
17.4 "Multicast" gateway 58
17.5 « Unitelway » gateway 60
18 DIAGNOSTIC MENU 61

Appendix 1 : Data rate versus distance and cable quality table

Appendix 2 : Html server description

1 Products identification

XSRING SHDSL switch	2400	2220	2230
SHDSL ports	2	2	2
Maximum data rate (Mb/s)	2.3	2.3	2.3
10-100 Mb/s ethernet ports	4	2	2
RS232	0	1	2
RS485	0	1	0
Gateway (raw, telnet, modbus, unitelway)	0	2	2

The product is delivered with

Cable ref. CAB614 for connection to the line (Qty 2)

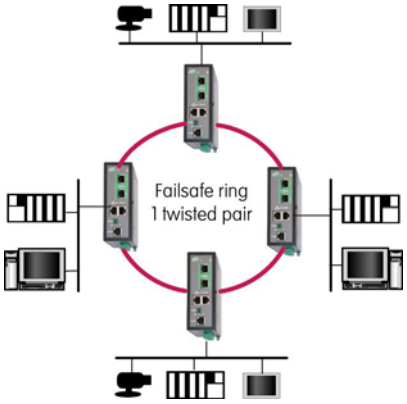
2 Product overview

2.1 Function

The XSRING shdsl switch enables to build a kilometres long failsafe ring or multidrop or point to point ethernet network using simple voice-grade twisted pairs (telephone lines).

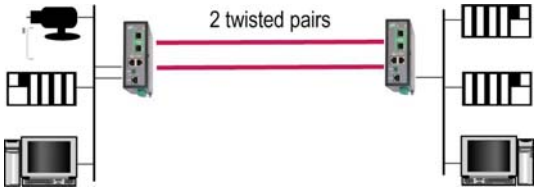
Multidrop network

Failsafe ring network



Point to point
1 pair (up to 2.3 Mb/s)

2 pairs operation
(up to 4.6 Mb/s



2.2 Shdsl operations

The XSRING comes with 2 SHDSL interfaces which allow to build multidrop or failsafe ring Ethernet network over kilometres at up to 2.3 Mb/s.
The product also offers an inverse-multiplexing function making possible to transmit at a data rate up to 4.6 Mb/s.

2.2.1 Data rate

Each interface features an adaptive data rate from 128 Kb/s up to 2.3 Mb/s.

The data rate is a function of the cable quality and the distance with the next SHDSL switch. For instance, the maximum distance between 2 switches through a line is 13 Km (8 miles) with a 0.9 mm wire diameter cable.

2.2.2 Distance between neighbour switches

The table in appendix 1 gives the data rate which can be expected over a line versus the length of the line (distance between 2 switches).

2.2.3 Failsafe ring operations

Daisy chain topology may not be safe enough when the network comprises a large number of switches or if the process is critical for any reason. Failsafe ring topology provides much more reliability :

If a line failure occurs, the communication will be recovered with all devices within less than 100 ms.

If a SHDSL switch is in failure, or if the power is no longer supplied to the product, the communication will be also recovered with all devices except the devices connected to the switch in failure.

In all cases, an alarm will be delivered (see Operation chapter).

2.3 Ethernet ports

The XSRING provides 2 or 4 ethernet RJ45 interfaces (depending on the product reference).

2.4 VLAN

The XSRING features VLANs per port :
Each Ethernet port can be assigned to a particular VLAN. A device connected to an Ethernet port belonging to a particular VLAN can communicate only with devices connected to Ethernet ports belonging to the same one.

2.5 Quality of service

The product provides “DiffServ” quality of service functionality to give transmission priority to critical applications.

Devices TCP ports and IP addresses are classified in 4 priority classes.
A minimum and a maximum bandwidth is allocated to each class.

2.6 SNMP

The XSRING is compliant with the MIB II. Tha status of he SHDSL conections can be acquired and traps are sent to the SNMP manager when the SHDSL lines connect or disconnect.

2.7 Serial gateway

The XSRING –2220, -2230 feature a 2 ports serial gateway.
The gateway features raw TCP client and server, raw UDP, modbus client and server, telnet and multicast.

2.8 Diagnostic functions

The XSRING html server provides diagnostic pages giving the guarantee the transmission quality is what it has to be.

2.9 Html or DIP switches configuration

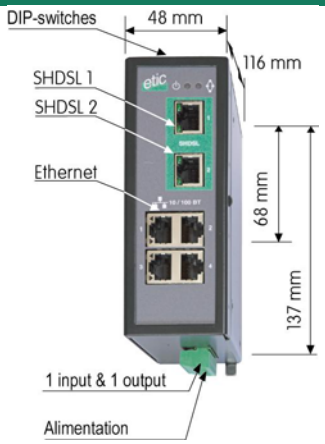
The XSRING can be configured either with an html browser if advanced functions are necessary (QoS, RS gateway, diagnostic …).
It can be configured with a few DIP switches for simple unmanaged applications.

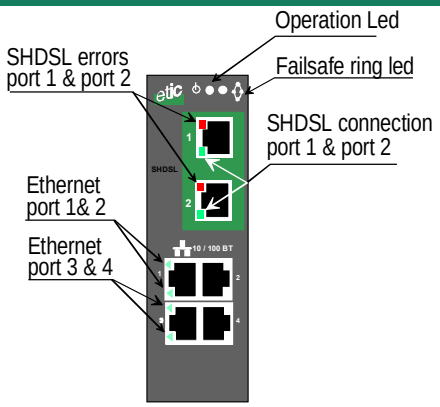
3 Data sheet

Dimensions	137 x 48 x 116 mm (h, l, d)
C.E.M	EN50082-2
Electrical safety	EN 60950
Thunder	EN61000-4 et -5
Supply voltage	XSRING-2400 or XSRING-2230 : 9 to 60 VDC XSRING-2220 : 9 to 30 VDC
Consumption	4W
Operating T°	-20°/ + 60°C non condensing
SHDSL	ITU-T G.991.2, 802.3ah : 2BaseTL (EFM) Data rate : 128 kb/s to 2.3 Mb/s with 2 wires Latency : 4 ms
Ethernet	XSRING-2400 : 4 ports XSRING-2220 or –2230 : 2 ports 10/100 Mb/s Half / Full duplex Auto MDI/MDIX
Switch	Store and forward - 1024 MAC @
Failsafe ring	Spanning Tree IEEE 802.1d Healing delay for a 10 switches network : 100 ms
Router	Static routes RIP V2
QoS	DiffServ compliant with RFC 2474, 2475, 2597, 2598 4 priority levels (premium, gold, silver, bronze)
SNMP	SNMP V2 – MIBII and traps
VLAN	Per port
RS232-RS485	1200 to 115200 kb/s parity E/O/N Raw TCP client and server Raw UDP Modbus client and server Unitelway Telnet
Logs	300 events (date & time)
Configuration	Managed mode : HTML browser Unmanaged mode : DIP switches

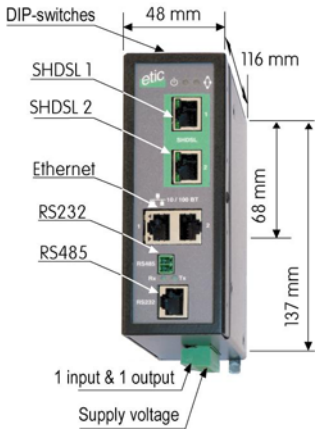
1 Product description

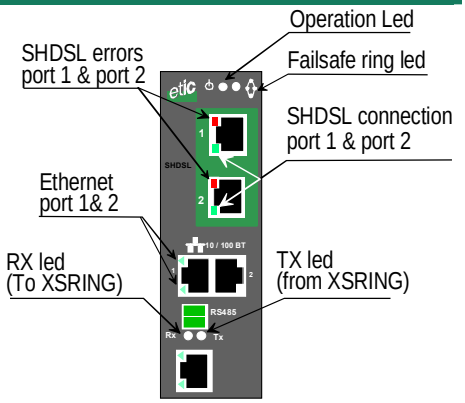
XSRING-2400



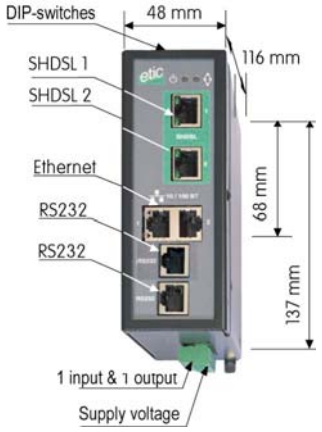


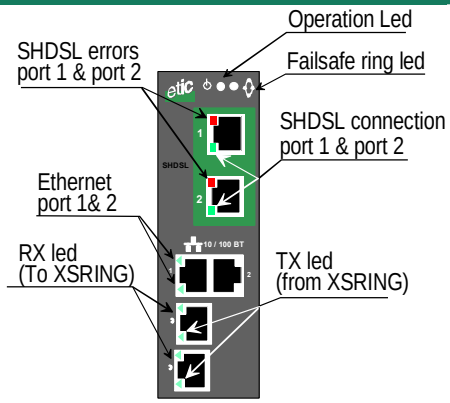
XSRING-2220





XSRING-2230





1.1 Leds

Function	led	
Ethernet	LINK/DATA	Ethernet activity
RS232	Rx	Bytes received from the RS232 (to XSRING)
	Tx	Bytes transmitted to the RS232 (from XSRING)
RS485	Rx	Bytes received from the RS485 (to XSRING)
	Tx	Bytes transmitted to the RS485 (from XSRING)
Shdsl led (Green - Lower)	Line	Slowly blinking : Shdsl connection in process Lit on : Shdsl connection set Quickly blinking : Traffic over the SHDSL link
Shdsl led (Red - Upper)	Error	Off : Error-free transmission Quickly blinking : Transmission errors
Operation	⏻	Green : Ready for use Red : Alarm
Failsafe ring	◈	Green : Ring Master / the ring is safe Red : Ring defect OFF : Ring slave

1.2 Connectors

8 pins screw block Supply voltage and input / output		
Pin Nr	**Signal**	**Function**
1	Power 1 +	Supply voltage input 1
2	Power 1 -	0 V
3	Power 2 +	Supply voltage input 2
4	Power 2 -	0 V
5	3V3	+ 3.3 VDC voltage provided by the product
6	In	Input
7	F +	Output + (max 48Vdc - 0,5A)
8	F -	Output -

SHDSL RJ45 connector		
Pin Nr	**Signal**	**Function**
1	N.C.	-
2	N.C.	-
3	N.C.	-
4	TIP	SHDSL line
5	RING	SHDSL line
6	N.C.	-
7	N.C.	-
8	N.C.	-

Ethernet RJ45 connector		
Pin Nr	**Signal**	**Function**
1	Tx +	TX polarity +
2	Tx -	TX polarity -
3	Rx +	Reception polarity +
4	N.C	-
5	N.C	-
6	Rx -	Reception polarity -
7	N.C.	-
8	N.C.	-

RS485 2 pins screw block		
Pin Nr	**Signal**	**Function**
1	A	RS485 polarity A
2	B	RS485 polarity B

RS232 RJ45 connector (To connect to a DCE)			
Pin Nr	**Circuit**		**Function**
1	DTR - 108	Out	Data terminal ready
2	TD - 103	Out	Data Emission
3	RD - 104	IN	Data Reception
4	DSR - 107	IN	Data set ready
5	SG - 102	-	Ground
6	Not used	Out	-
7	CTS - 106	IN	Clear to send
8	RTS - 105	Out	Request to send

1.3 DIP switches and pus-button

DIP switches			
SW 1	SW 2	**Management**	
OFF	OFF	The current IP@ of the product is the stored IP @	
ON	OFF	**The active IP@ of the product is the factory IP@ : 192.168.0.128 No login and password are required to access to the html server**	
OFF	ON	The active IP@ is provided by the BOOTP or DHCP server.	
ON	ON	No IP @ is assigned to the product; DIP switch configuration	
SW 3	SW 4	SW 5	**Shdsl port 1**
OFF	OFF	OFF	NTU mode
OFF	OFF	ON	LTU mode - Auto
OFF	ON	OFF	LTU mode – 2304 kbit/s
OFF	ON	ON	LTU Mode – 2048 kbit/s
ON	OFF	OFF	LTU Mode – 1536 kbit/s
ON	OFF	ON	LTU Mode – 1024 kbit/s
ON	ON	OFF	LTU Mode – 512 kbit/s
ON	ON	ON	LTU Mode – 256 kbit/s
SW 6	SW 7	**Topology**	
OFF	OFF	Point to point or daisy-chain	
ON	OFF	Failsafe ring & ring master	
OFF	ON	Failsafe ring	
ON	ON	Point to point with inverse-multiplexing (2 lines = 4 wires)	
SW8 to SW12		Not used - Must be left OFF	

Push-button :
A push-button is located close to the DIP switches.
It enables to restore the factory profile.
To restore the factory profile, switch the power on while pressing the push-button until the OPERATION led turns green.
Attention : Once the factory profile has been restored, the stored configuration is lost.

2 Ventilation

To avoid overheating when the ambient temperature is high, leave a 1 cm (0.5 inch) space on each side of the product.

3 Supply voltage

The product comes with 2 separate voltage inputs, so that 2 external power supply modules can be connected to the product. If one power supply module fails, the XSRING will be powered by the other.

The supply voltage must be

- strictly lower than 60 VDC and higher than 9 VDC for XSRING-2400 and XSRING-2230.
- strictly lower than 30 VDC and higher than 9 VDC for XSRING-2220.

The consumption is 170 mA at 24 VDC.

4 Fuse

The product is protected with a 3A fuse located on the electronic board near the supply voltage connectors.

!!! A replacement fuse is available on the board ; it is located over the leds.

5 Ethernet ports

The XSRING features two or four auto-sensing 10/100 Mbps MDI/MDI-X LAN ports.

6 RS232 (XSRING-2220 and XSRING-2230)

The RS232 data rate can be tuned from 1200 to 115200 b/s with parity (even / odd) or no parity.

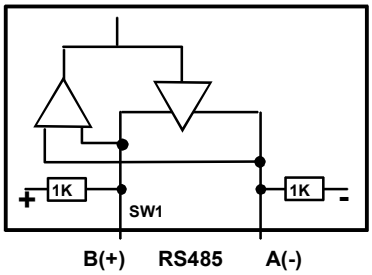
The data terminal must be less than 10 meters far from the modem.

Cables can be provided to connect the product to DTE and DCE as follows :

RS232 cables (L=1m)		
Code	**User connector**	**Cable function**
CAB592	SubD 9 male	To connect a DCE to the XSRING
CAB593	SubD 9 female	To connect a DTE to the XSRING
CAB609	wires	To connect a device providing a specific connector

7 RS485 (XSRING-2230)

The RS485 serial interface is provided on the front panel 2 pins screw-block.



Polarisation resistors
1 Kohm bus polarisation resistors are included inside the product.

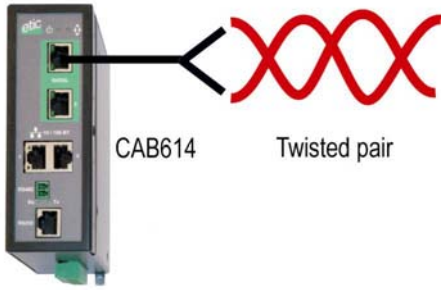
RS485 line adaptation
For a several meters long connection over the RS485 local interface, it is not necessary to adapt the RS485 line. For a longer distance, connect a 120 Ohm resistor at each end of the line.

8 SHDSL line

SHDSL cable

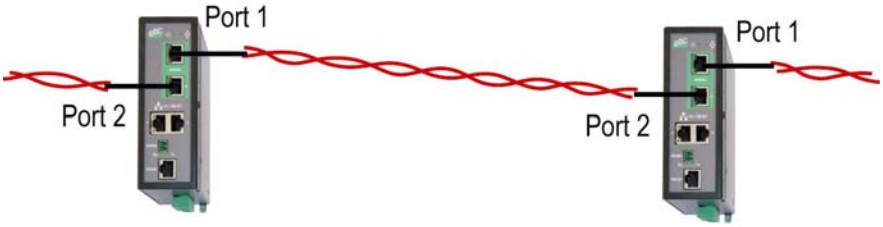
The XSRING is delivered with 2 cables (CAB614); each cable allows to connect the product to one line.
The cable comes with 2 wires which have to be connected to the two wires of the twisted pair.

The 2 wires can be inverted.



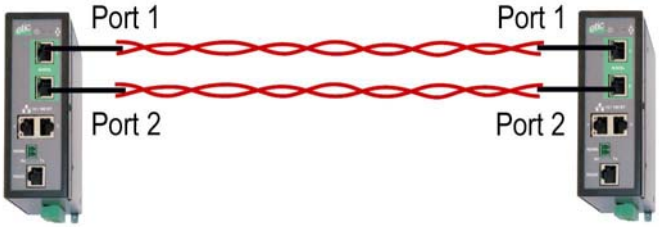
Case of a ring or of a multidrop connection

It is more simple to connect the SHDSL port 1 of one switch to the SHDSL port 2 of the other switch according to the drawing hereafter.
In that way, the setting of each SHDSL switch will be the similar (except some parameters like the IP address).

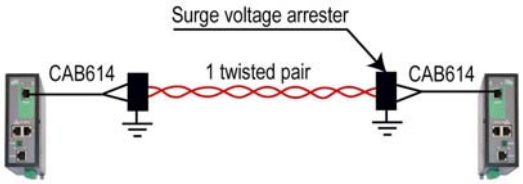


Case of a two twisted pairs connection

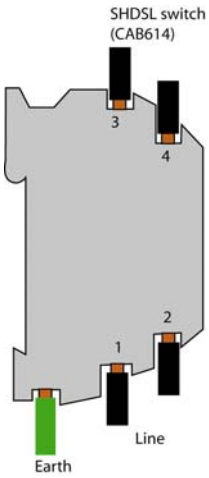
Two XSRING switches can be connected with two pairs instead of only one. The data rate is doubled.
In that particular case, the port Nr 1 of the first SHDSL switch must be necessarily connected to the port Nr 1 of the other switch.



Surge voltage arrester
if the line is exposed to the lightning, we advise to use an over voltage arrester at each end of the line.



We have selected the Phoenix Contact module TT-2-PE-24D; it must be wired as indicated opposite.

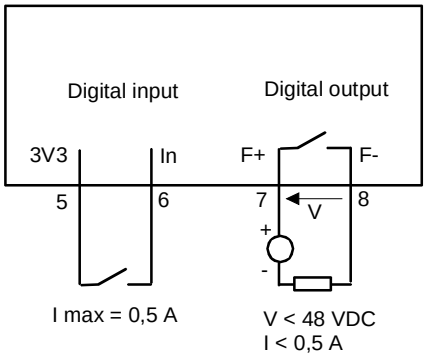


Line cable shield :
If the line is shielded, the shield must be connected to the earth; only at one end if it is not interrupted along the line.

9 Input and output

Input
That input is not isolated.
if it is opened, an SNMP trap will be sent to the SNMP server is that function has been enabled.

Alarm output
1 relay output is provided to indicate an alarm.
The alarm condition can be selected using the html server.
The Output is open when the XSLAN is OFF or when a SHDSL line is not connected.



1 Overview

The XSRING can be configured either with DIP switches or with an html browser through Ethernet.

The Html server offers useful diagnostic functions like Error rate statistics and logs. It is advised to use the html server when the network is complicated or when distances between SHDSL switches are long.

Moreover, advanced functions like Quality of Service, serial gateway and VLAN can only be configured with the html server.

2 Dip switches configuration

2.1 Enabling DIP switches configuration

To select DIP switches configuration, set the DIP switches SW1 et SW2 ON.

2.2 SHDSL port 1 configuration (SW3, SW4, SW5)

The DIP switches SW3, SW4, SW5 allow to set up the SHDSL switch port 1. Port 2 will be automatically set up.

When two XSRING SHDSL switches are connected through a line, the port of the first one has to be set as an LTU (calling party) and the port of the other one has to be configured as an NTU. (called party).

The SHDSL switch port which is set as LTU is in charge of negotiating **the data rate over the line**; the NTU can only accept.

The data rate can be either negotiated by the LTU itself (auto mode) , or imposed by the user with the DIP switches.

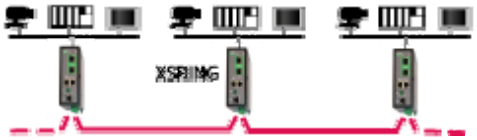
To set up the data rate, refer to the table of appendix 1; it gives the expected data rate according to the distance and the wire diameter.

Remark :
It is advised to select the AUTO mode only for test purposes, because the connection delay can be long.

2.3 SHDSL network topology DIP switches (SW6, SW7)

- **Point to point or daisy chain**

Set the SW6 and SW7 OFF.



- **Failsafe ring**

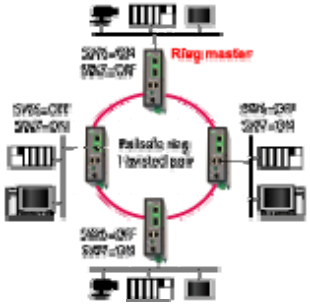
The ring topology provides a much better availability, in particular when the network includes a great number of SHDSL switches :

if one line fails, the communication remains possible as previously between all the devices.

If one SHDSL switch fails, the communication remains possible except with the devices connected to the SHDSL switch in failure.

Ring master :
Set SW6 ON and SW7 OFF

Other SHDSL switches :
Set SW6 OFF and SW7 ON



- **Two twisted pairs operation**

The data rate will be twice what it would be with only 1 pair (2 wires). Moreover, in case of a failure of 1 line, the other line will backup the transmission.

Set SW6 ON and SW7 ON.

2.4 SHDSL port 2 configuration

Once the SHDSL port 1 has been set up with the DIP switches SW3, SW4, SW5 and once the network topology has been configured with the DIP switches SW6 and SW7, the SHDSL port 2 configuration is automatically set up by the product itself.

3 Testing the SHDSL connection and adjusting the data rate

- Connect two SHDSL switches to the line and power them up as explained at the "Installation" chapter.

Remark :
For test purpose on a desk, the line can be replaced by any Ethernet straight cable.

The line led of the RJ45 SHDSL connector (it is the lower led) blinks during the connection phase (45 seconds more or less) and lights on when the connection is established.

- Test the error rate by pinging remotely one of the devices connected to the other XSRING.

- If the Ping error rate is not close to 0%, decrease the data rate using the DIP switches SW3, SW4, SW5.

4 Testing the Failsafe ring

The ring topology provides a much better availability :

if one line fails, the communication remains possible as previously between all the devices.

If one SHDSL switch fails, the communication remains possible except with the devices connected to the SHDSL switch in failure.

To check the failsafe ring runs properly,

- Connect a PC to the ring master XSRING and ping periodically a remote device.
- Disconnect the ring master XSRING from its line 1 and check the Pings go on receiving a response after the cicatrisation delay**.**
- Check the failsafe ring led turns red.
- Check the digital alarm output opens.
- Connect the XSRING to its line 1.
- Check the output is closed and the failsafe ring led turns green.
- Do the same with the line Nr 2 of the ring master XSRING.

Setting-up the XSRING with the Html server is mandatory

when the distance between two SHDSL switches is close to the limit to take advantage of the Diagnostic functions,

or

when advanced functions like VLAN, Quality of Service, SNMP, serial gateways, which can only be configured with the html server, are required.

1 Set up steps

To configure the XSRING, we advise to proceed as follows :

- Connect a PC to the router
- Set up the LAN interface
- Set up IP routing and broadcast filtering (option)
- Set up the SHDSL connection :
  Multi-drop or failsafe ring or two pairs operation
- Set up VLAN
- Set up Quality of service
- Set up SNMP
- Set up the serial gateway

2 Enabling html configuration

Coming from factory, the DIP switches SW1 and SW2 are set OFF (ready for html configuration); and the IP address of the XSRING is 192.168.0.128.

Check the DIP switches SW1 and SW2 are OFF.

Remark :
When the DIP switches SW1 and SW2 are OFF, the active IP address is the stored IP address.

3 Connecting a PC to the XSRING for configuration

3.1 Overview

Administration server address :
The administration html server is located at the LAN IP address of the SHDSL switch (The factory IP address is192.168.0.128).

First set up :
For the first configuration, we advise to connect the PC directly to the LAN interface of the SHDSL switch..

Further set up modifications :
Modifications can be carried out from the LAN interface, or remotely through the line.

Restoring the factory IP address :
The factory IP address of the router on the LAN interface can be restored by setting the DIP switches SW01 ON and SW02 OFF.
In that position of the DIP switches, the stored configuration is not deleted.
Setting the DIP switches in that position gives also a free access to the administration server from the LAN interface.
During operations, the DIP switches must not be left in that position.

Network IP address :
Later in the text, we often speak of "network IP address".
We mean the lowest value of the addresses of the network.
For instance, if the netmask of a network is 255.255.255.0, the network IP address of that network is X.Y.Z.0.

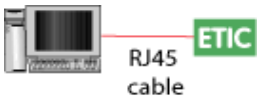
Copy and paste :
Parameters must be entered with the keyboard; they cannot be pasted.
However, it can be useful to paste a string when it is long to avoid errors.
In that case, paste the string, delete the last character of the pasted string, and enter it again with the keyboard.

Saving and restoring the parameters file (see the maintenance chapter)
A parameters file can only be downloaded to a product with the same firmware version. It is why, we advise to assign a name to a parameter file including the product name and the software version like for instance "my_xsring2400_file _V241.bin".

3.2 First configuration

Step 1 : Create or modify the PC IP connection.
Assign to the PC an IP @ in accordance with the WSRING IP address.
For the first configuration, assign or instance 192.168.0.127 to the PC.

Step 2 : Connect the PC directly to an XSRING ethernet interface using any Ethernet cable (straight or cross-wired)



Step 3 : Launch the navigator
Enter the LAN IP @ of the SHDSL switch192.168.0.128.

The Home page of the administration server is displayed

Note :
If the home page cannot be displayed, refer to paragraph 4 below.

3.3 Modifying the configuration from the LAN

Step 1 : Ensure the DIP switch SW1 and SW2 are OFF to select the stored IP @.

Step 2 : Launch the html browser and enter the IP address assigned to the router.

Or, launch the ETICFINDER utility to detect the XSRING IP address.

Remark :
If the home page cannot be displayed, refer below.

4 Rebooting the XSRING after parameters changes

- After the parameters of any page have been completed, click the « Save » button at the bottom of the page.

- After some parameters changes, the XSRING must restart.

When the configuration has been completely carried out, click the « Reboot » red button in the green bar, when displayed.

- Once the product has restarted, check the « Reboot » button has disappeared from the green bar.

T**o save the configuration file to a hard disk :**

- Select the “maintenance” menu and then the “Save / restore” menu.

- Click the “Save current configuration to disk” button.

5 Recovering the factory LAN IP address

When launching the html browser, the homepage of the html server may not be displayed; the cause may be the IP address you entered was wrong.

if the IP address you enter is wrong, you can recover the factory IP address by setting SW01 ON and SW2 OFF.
The factory IP address 192.168.0.128 will be restored as long as the SW01 and SW02 micro switch will be left in that position.

Remark :
The SW01 and SW02 must not be left in that position during operations.

6 Recovering the factory configuration

For any reason, it may be necessary to restore the factory configuration of the SHDSL switch.

To restore the factory configuration,

- Switch OFF the power supply.
- Press the push button on the top part of the IPL-E router and switch ON the power supply.
- Keep the push button pressed until the Operation led turns red.

Remark : The stored configuration will be lost; the factory IP address 192.168.0.128 will be restored.

7 Restricting access to the administration server

The access to the administration server can be protected by a login and password.

To protect access to the administration server,

- Select the “System” menu, and then the “Administration rights” menu.

8 Recovering a free access to the administration server

If the Login & or password entered to reach the administration server have been rejected, it is possible to recover a free access to the administration server from the LAN only, by setting SW01 ON and SW2 OFF.

Remark :
The factory IP address 192.168.0.128 will also automatically be restored as long as SW01 will remain ON and SW2 OFF.
During normal operations SW01 and SW02 must not be left in that position.

9 Assigning an IP address to the LAN interface

An IP address must be assigned to that interface.

The HTML server is located at that IP address.

To assign an IP address to the LAN interface,

- select the “IP protocol and IP routing” menu and then the IP menu;
- enter the IP address, the netmask and the default gateway address.

10 IP routing and broadcast filtering

The SHDSL XSRING switch is an Ethernet switch; it works like any usual switch and it is able to transmit any upper level protocol.

It is why, generally, it is not necessary to enable the IP routing function.

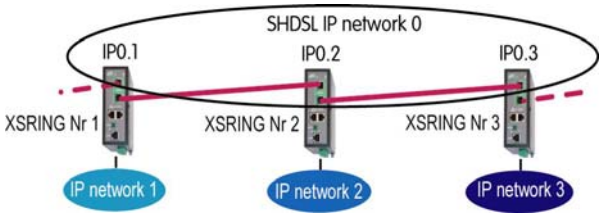
However, the IP routing feature can be used in particular cases, to avoid to transfer multicast or broadcast frames or other traffic towards the SHDSL link.

In that case, to make IP routing possible,

1. The SHDSL network has to be set as an IP network. An IP address must be assigned to the SHDSL interfaces of the XSRING.

2. The network connected to the LAN interface of the XSRING must be a different IP network from the SHDSL IP network and from other networks.

For instance, referring to the drawing below, if the XSRING Nr 1 is used as a router, the IP @ of the network 1 must be different from any other network : SHDSL network, network 2, network 3.



3. Routes must be created or the RIP protocol must be enabled.

A route is a table which registers which gateway address must be used to transfer IP packets to a particular network.

For instance, referring to the drawing above, If the routing function has been enabled in the XSRING Nr 1, and if IP packets have to be transmitted from the IP network 1 to the IP network 2, a route has to be created as follows :

Route name : "From NETWK 1 to NETWK 2"
Destination IP addr : "network 2 IP address"
Gateway IP addr : IP02

Remarks :
"Network 2 IP address" is the address of the network Nr 2; for instance 192.168.2.0.

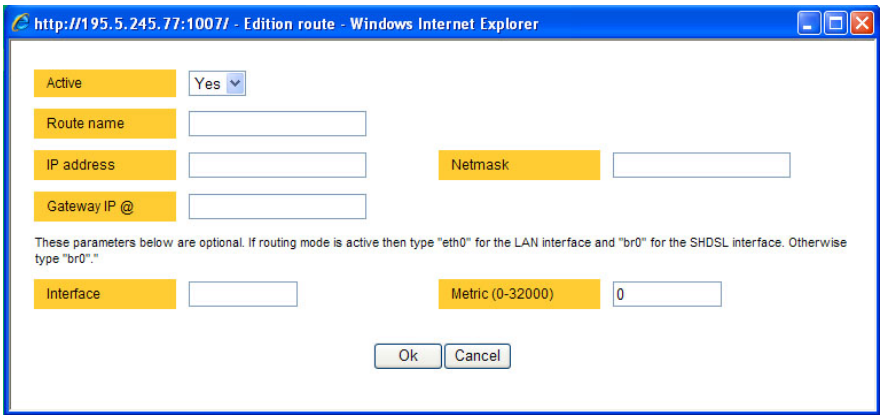
IP02 is the address of the SHDSL interface of the XSRING Nr 2.

To enable the routing function and assign an IP @ to the SHDSL interface,

- select the "IP protocol & routing" menu and then the "IP protocol" menu,
- Select the "Routing mode active" checkbox.
- Enter the IP address, netmask, and, eventually, default gateway assigned to the SHDSL network.

To register a route,

- select the “IP protocol & routing” menu and then the “routing” menu,
- click the ”Add a route” button.
- Enter the parameters of the route.



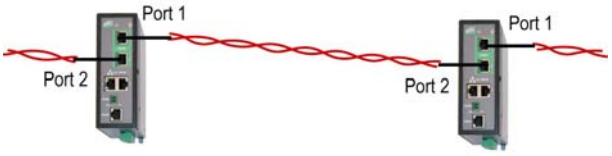
To enable the RIP protocol instead of programming routes,

- select the “IP protocol” and then the “RIP” menu.
- Select the “Activate” checkbox.

11 Multidrop network set up

11.1 Set up

Once the XSRINGs will have been set up, they must be connected to the line according to the drawing opposite.



To set up the SHDSL ports,

- Select the Ethernet & switching" menu and then the "SHDSL port" menu.

Setting up port 1

- Select the LTU checkbox.
- Select the data rate according to the table of the appendix 1.

  Note : If the "auto" option is selected, it will cause the XSRING to try all the data rates. The connection delay will be long. Moreover, the XSRING software will select a cautious solution. It is why the "auto" option will be selected only if the distance is short (less than, 1 Km).

- Select the "Signal power" value "Auto".

The power of the signal emitted towards the line is normally 14.5 dBm. It must not be reduced except for very short distance transmission and if errors appear.

Setting up port 2

- Select the NTU checkbox.
- Select the "Signal power" value "Auto".

11.2 Testing the SHDSL connection and adjusting the data rate

- Connect two XSRINGs to a line, check the line led (the lower led of each SHDSL connector) blinks during the connection (about 45 seconds) and then lights on.

- If the led blinks endlessly, it means the connection cannot be established; select a lower data rate.

- Once the connection is established, select the “Diagnostic” menu, and then the “Network status” menu and then the “Statistics” menu.

Check the “SNR margin” is greater than 6. Otherwise decrease the data rate.

- Select the “Diagnostic” menu, and then the “Log” menu.

  Check the XSRING remains permanently connected. Disconnections must be very rare. If disconnections are frequent, check the line itself and / or decrease the data rate.

12 4,6 Mb/s point to point connection set-up

12.1 Overview

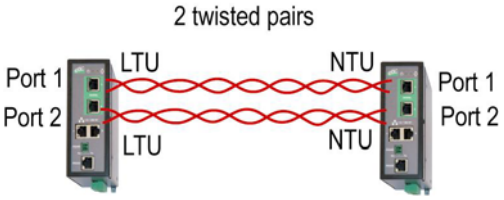
A point to point communication at a data rate of up to 4,6 Mb/s instead of 2,3 Mb/s can be provided with two twisted pairs.

An SHDSL connection is established at a data rate of up to 2,3 mob/s on each twisted pair.

The data flow is automatically shared over the two pairs.

12.2 SHDSL ports set-up

Once the XSRINGs will have been set up, they must be connected to the line according to the drawing opposite.



XSRING Nr1 XSRING Nr 2

Setting up the XSRING Nr 1

- Select the Ethernet & switching" menu and then the "SHDSL port" menu.
- Select the LTU checkbox for port 1 and port 2
- Select the data rate for port 1 and port 2 according to the table of the appendix 1.

  Note : If the "auto" option is selected, it will cause the XSRING to try all the data rates. The connection delay will be long. Moreover, the XSRING software will select a cautious solution. It is why the "auto" option will be selected only if the distance is short (less than, 1 Km).
- Select the "Signal power" value "Auto" for port 1 and port 2.
- Select the "SHDSL ports aggregation" checkbox.
- Save and click the reboot button.

Setting up the XSRING Nr 2

- Select the Ethernet & switching" menu and then the "SHDSL port" menu.
- Select the NTU checkbox for port 1 and port 2.
- Select the "Signal power" value "Auto" for port 1 and port 2.
- Select the "SHDSL ports aggregation" checkbox.
- Save and click the reboot button.

13 Failsafe ring set up

13.1 Overview

The failsafe ring topology improves availability of the network :

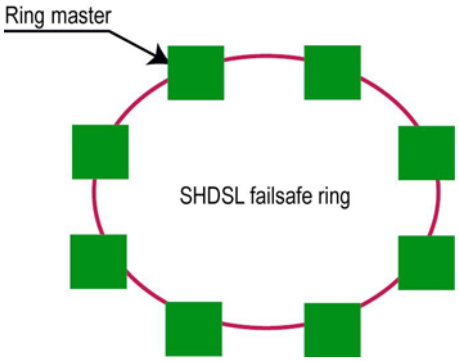
if one line fails, the communication remains possible as previously between all the devices.

If one SHDSL switch fails, the communication remains possible except with the devices connected to the SHDSL switch in failure.

The XSRING provides two kinds of failsafe ring solutions :

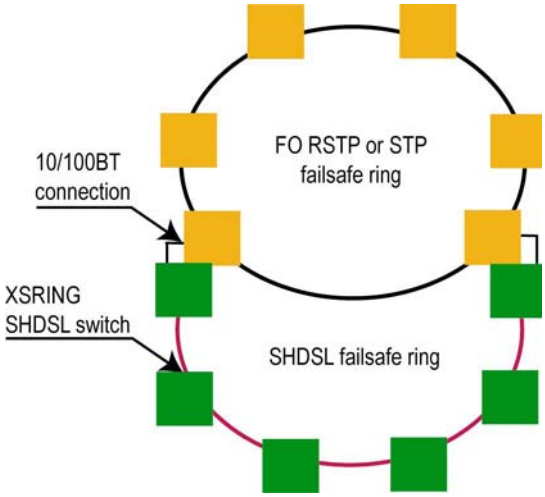
The ETIC failsafe ring :

It is a proprietary solution.
The cicatrisation delay is short and the configuration very simple; but it runs only if the network is a ring.
One switch of the ring has a particular function; its name is the Ring master.
The function of the Ring master is to interrupt virtually one of the two lines to which it is connected so as to avoid the endless propagation of broadcast frames or of some other frames.
If the ring master fails, the communication remains possible between the devices connected to the other XSRING. Switches.



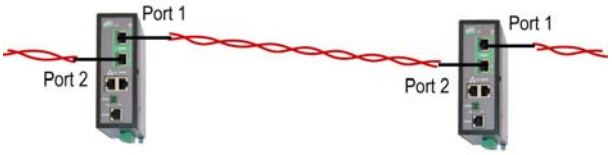
The spanning tree algorithm (STP) :

STP is the usual name of the algorithm described by the IEEE 802.1D norm; it works with switches from different manufacturers if they manage Spanning Tree or Rapid Spanning Tree even if some segments of the network are optical, or 10/100BT or SHDSL segments. The spanning tree algorithm if efficient when the topology is complex, like a double attachment rings for instance.



13.2 SHDSL port set up

Once the XSRINGs will have been set up, they must be connected to the line according to the drawing opposite.



- Select the Ethernet & switching" menu and then the "SHDSL port" menu.

Setting up port 1

- Select the LTU checkbox.
- Select the data rate according to the table of the appendix 1.

  Note : If the "auto" option is selected, it will cause the XSRING to try all the data rates. The connection delay will be long. Moreover, the XSRING software will select a cautious solution. It is why the "auto" option will be selected only if the distance is short (less than, 1 Km).

- Select the "Signal power" value "Auto".

The power of the signal emitted towards the line is normally 14.5 dBm.
It must not be reduced except for very short distance transmission and if errors appear.

Setting up port 2

- Select the NTU checkbox.
- Select the “Signal power” value “Auto”.

13.3 Setting up a failsafe ring using the ETIC ring

To set up the RING master switch

- Select the “Ethernet & switching” menu and then the “failsafe ring” menu.
- Select the “failsafe ring active” checkbox.
- Select the “Ring master” checkbox.
- Click the red button “REBOOT” to restart the product.

To set up the RING master switch

- Select the “Ethernet & switching” menu and then the “failsafe ring” menu.
- Select the “failsafe ring active” checkbox.
- Click the red button “REBOOT” to restart the product.

13.4 Setting up a failsafe ring using STP

- Select the “Ethernet & switching” menu and then the “failsafe ring” menu.
- Select the “STP active” checkbox and leave the default value of the additional parameters otherwise refer to the STP norm IEEE 802.1D .
- Click the red button “REBOOT” to restart the product.

13.5 Testing the SHDSL connection and adjusting the data rate

- Connect two XSRING to a line, check the line led (the lower led of each SHDSL connector) blinks during the connection (45 seconds) and then lights on permanently.

Remark : The led glitters slightly with the shdsl traffic.

- If the led blinks endlessly, it means the connection cannot be established; select a lower data rate.

- Once the connection is established, select the “Diagnostic” menu, and then the “Network status” menu and then the “Statistics” menu.

Check the “SNR margin” is greater than 6. Otherwise decrease the data rate.

- Select the “Diagnostic” menu, and then the “Logs” menu.

Check the XSRING remains permanently connected. Disconnections must be very rare. If disconnections are frequent, check the line itself and / or decrease the data rate.

13.6 Checking the RING function

Checking the safe situation

- Check the failsafe ring led is green and the digital output is closed.
- Connect a PC to one of the XSRINGS switches and check you can ping any of the devices of the network.
- Check the response delay is appropriate :
  the XSRING latency is more or less 4 ms; it means that if the ring includes 5 XSRINGs, the response time can be up to 5 * 4 ms * 2 = 40 ms.
  The latency of the device must be added to that value.

Checking the line failure situation

- Disconnect one line;
- Check that the failsafe ring led turns red and that the digital output opens,
- Check an SNMP trap is sent to the SNMP server (if that function has been set up)
- Check the communication remains possible between the different devices
  Remark : The response time of some devices may change.
- Connect the line again.
- Check the failsafe ring led turns green and the digital output is closed.
- Check an SNMP trap is sent to the SNMP server (if that function has been set up)

14 VLAN set up

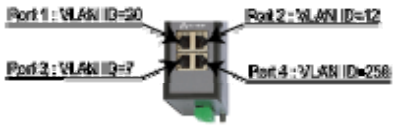
14.1 Overview

VLAN is a flexible group of devices that can be located anywhere in a network, but that can communicate as if they are on the same physical segment.

Devices within a VLAN can only communicate directly with devices belonging to the same VLAN. If a device belonging to VLAN 1 needs to communicate with devices in VLAN 2, the traffic needs to pass through a routing device or Layer 3 switch.

An Ethernet frame belonging to a particular VLAN is tagged with a code which is the VLAN identity code.

Four VLANs are managed by each XSRING.
Each Ethernet port of an XSRING can be assigned to one of that four VLANs.



The HTML administration server and the serial gateway can also be assigned to one of that four VLANs.

Each RJ45 port can be set up as “Untag” or “Tag” or “Trunk” or “All access”.

“Untag” port
A port must be set up as “Untag” if the device connected to the port must only communicate with devices belonging to the same VLAN.

Untagged Ethernet frames entering the port are tagged by the XSRING with the VLAN id code before being transmitted to the SHDSL network or to other ports of the XSRING.
Already tagged Ethernet frames entering the port are transmitted only if they belong to the right VLAN.

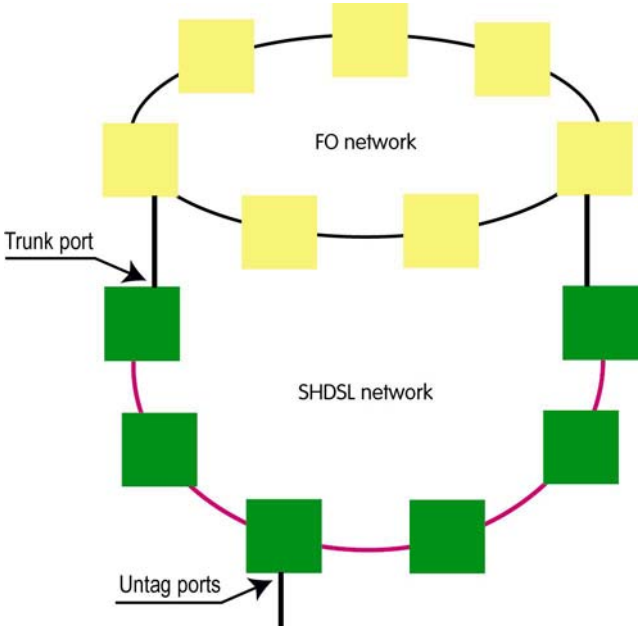
Reciprocally, Ethernet frames coming from the SHDSL network or from other ports of the XSRING can be transmitted to the port only if they are tagged with the right VLAN ID code.

Before being transmitted to the port the Ethernet frames are untagged by the XSRING.

"Trunk" port
An Ethernet port must be set up as a "Trunk" port, when that port is used to connect an SHDSL network to another network like an optical network for instance.

All tagged Ethernet frames entering the port are transmitted towards the SHDSL network or other ports.
Untagged Ethernet frames are tagged by the XSRING with the right VLAN ID code.

Reciprocally, all tagged Ethernet frames coming from the SHDSL network are transmitted to that port. They are not untagged by the XSRING.
Untagged Ethernet frames are tagged by the XSRING with the right VLAN ID code.



“Tag” port
An Ethernet port must be set up as a “Tag” port, when the device connected to that port tags the Ethernet frames by itself.

Ethernet frames entering the port are transmitted towards the SHDSL network or other ports only if they are tagged with one of the four VLAN ID codes registered by the XSRING.

Reciprocally, Ethernet frames coming from the SHDSL network or from other ports of the XSRING can be transmitted to the port only if they are tagged with the right VLAN ID code.
They are not untagged by the XSRING.

“All access” port
Don’t use that value

14.2 VLAN set up

- Select the “Ethernet” menu and then the “VLAN” menu.
- Enter the four VLAN Id codes in the first column (1 to 4096)
- Assign a VLAN Id to each Ethernet port.
- Assign a VLAN Id to the html server.
- Assign a VLAN Id to the serial gateway.
- Assign the type of VLAN to each port (Untag, Tag, Trunk, All Access).

15 Quality of service (QoS) set up

15.1 DiffServ benefits & overview

The goal of Quality of Service algorithms is to guarantee that critical data flows will be transmitted with lower delay than others.

For instance, it can be difficult to transmit on the same SHDSL network an important video data flow and a small but critical PLC protocol data flow.

To solve that question, the XSRING implements the DiffServ algorithm.

- **Terms definitions**

A service is the association of a protocol (TCP, UDP, ICMP, AH, ESP, GRE, IGMP) and a port number; for instance TCP and port 502.

A target is a range of IP addresses (IP address plus netmask); for instance 192.168.1.0 / 255.255.255.0 .

A traffic is a particular data flow defined by a particular target and a particular service.

- **Classes :**

5 traffic classes are defined : Premium, Gold, Silver, Bronze, Default (or Best effort).

The Premium class is the class which will be transmitted with the first priority. The default class will be transmitted with the last priority.

A minimum and a maximum bandwidth are assigned to each class.

The bandwidth of the Premium class is not limited.

An example is given hereafter :

	Minimum bandwidth	Maximum bandwidth
	% of the whole bandwidth	% of the whole bandwidth
CLASSES :		
Premium	-	unlimited
Gold	20 %	30 %
Silver	15 %	20 %
Bronze	10 %	15 %
Default	5 %	unlimited
Total	60 %	

- **Assigning each traffic to the classes**

Each traffic (Service plus target) entering the shdsl network can be assigned to one class; Any traffic not assigned to one class is supposed to belong to the default class.

- **How it works ?**

The IP data flow entering the XSRING switch is analysed and **marked** as premium or gold or silver or bronze or default and then transported through the shdsl network with the relevant priority.

15.2 QoS set up

Step 1 : Complete the services list

- Select the “System” menu and then “Service list”.
- Add new services if necessary (Protocol & port number).

Step 2 : Define the destination IP addresses (Target)

- Select the “System” menu and then “Target list”.
- Click the “Add a target” button.

Enter an IP address to specify a single host (for instance 192.168.10.12) or a range of IP addresses and a netmask (for instance 192.168.10.0/255.255.255.0).

Step 3 : Define the classes

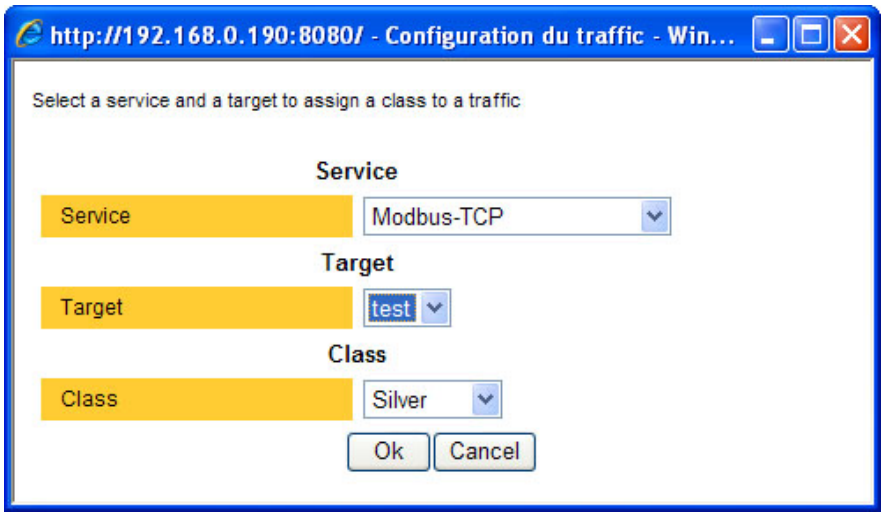
- Select the QoS menu and then the “Activation” menu.
- Select the QoS menu and the “Activation” menu; select the “Activation” checkbox.
- Select the “Classes” menu and assign a minimum and a maximum bandwidth to each class.

Step 4 : Define the classes

- Select the QoS menu and then the “Activation” menu.
- Select the QoS menu and the “Activation” menu; select the “Activation” checkbox.
- Select the “Classes” menu. Assign a minimum and a maximum bandwidth to each class.

Step 5 : Classify the traffics

- Select the QoS menu and then the “Traffic classification” menu.
- Click the “Add a traffic” button. The traffic window is displayed.



- Select a service (modbus TCP or html or FTP …), a target and a class and click OK.

16 SNMP set up

The XSRING is compliant with the MIB2.

The SNMP manager can acquire the status (Connected or not connected) of each SHDSL port.

The XSRING is also able to send SNMP traps

when each SHDSL connection is established.
or when each SHDSL connection is disconnected.

To enable the SNMP traps function,

- Select the “Alarm” menu and then the “SNMP” menu :
- Select the “Activation” checkbox.
- Enter the IP address of the management system.
- Enter the Sysname value (for instance XSRING).
- Enter the Syslocation value (for instance the label of the site where the XSRING is installed).
- Enable the traps related to the different events :
  Product startup
  SHDSL connection
  SHDSL disconnection

17 Serial gateway set up

The XSRING-2220 features 1 RS232 and 1 RS485 – 2 wires – ports.
The XSRING-2230 features two RS232 serial ports.

A serial gateway can be assigned to each serial port .

However, if the same type of gateway is assigned to both serial ports, the UDP or TCP port numbers must be different.
For instance, it is not possible to use modbus TCP with the port 502 at the same time on the serial ports 1 and 2.

The gateways listed below are provided :

Modbus client or server (i.e. master or slave)
To connect several serial modbus slaves to several IP modbus clients.
Or to connect a serial modbus master to an IP modbus server.

RAW TCP server or client :
To connect 2 serial devices through an IP network.

RAW UDP :
To exchange serial data between several serial and IP devices, through an IP network, using a table of IP addresses..

Telnet :
To connect a Telnet terminal to the RAS.

Unitelway slave :
To connect a serial unitelway master to an IP network.

17.1 « Modbus » gateway

The ETIC modbus gateway is made to link modbus devices connected to its serial interface to TCP modbus devices connected to the Ethernet TCP/IP network.

A TCP Modbus client device is a device connected to the Ethernet TCP/IP network and able to send a modbus request to a modbus TCP server which is in charge of answering; A TCP modbus client is equivalent to a master.

A TCP Modbus server device is a device connected to the Ethernet TCP/IP network and able to answer to a modbus request received from a TCP modbus client device. A TCP modbus server is equivalent to a slave.

A TCP modbus server can answer to any client of the Ethernet TCP/IP network.

The ETIC modbus gateway can be configured

either
to link serial slaves to several TCP modbus clients devices connected to the Ethernet network; in that case, select the modbus client gateway,

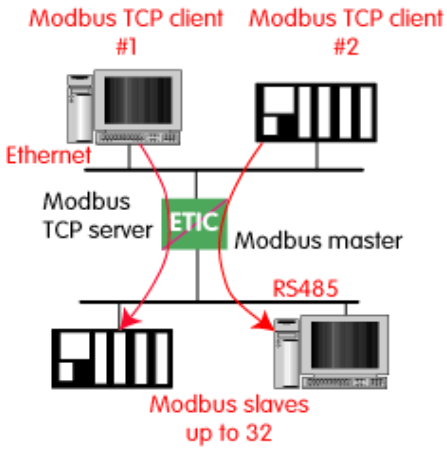
or
to connect a serial master to several TCP modbus servers devices connected to the Ethernet network; in that case, select the modbus server gateway.

17.1.1 Modbus server gateway

Modbus slaves devices are connected to the serial interface.

That gateway links asynchronous modbus slaves to modbus TCP clients connected to the Ethernet network.

Each TCP client (i.e. modbus master) can send requests to any modbus slave device of the serial interface.



To configure the Modbus server gateway,

- select the modbus menu and then modbus server,
- enable the modbus server gateway and set the parameters as follows:

"Modbus protocol" parameter :
Select the RTU or ASCII option

"Activate Proxi cache" parameter :
Enable the proxi option if you wish to avoid to frequent requests on the serial interface.

"Cache refreshment period" parameter :
the same request is received twice or more inside that delay, it will be sent only once to the slave on the serial interface.

"Timeout waiting for the answer" parameter :
Set up the timeout the gateway has to wait for the answer of the modbus slave.

"Local retry" parameter :
Set up the number of times the gateway will repeat a request to one of the modbus slaves on the serial interface before declaring a failure.

"Inter-character gap" parameter :

Set up the maximum delay the gateway will have to wait between a received character of a modbus answer frame on the serial interface and the following character of the same frame.

"Modbus slave address* parameter :

If only one modbus slave device is connected to the serial interface, set the modbus address of the device; any TCP modbus request received by the gateway will be sent on the serial interface using that modbus address.

If several modbus slave devices are connected to the serial interface, select "specified by modbus TCP client";
In that case, each request sent by the TCP/IP modbus client to one of the slaves connected to the serial interface must specify the modbus slave address value in the modbus address field.

"TCP inactivity Timeout" parameter :

Set the time the gateway will wait before disconnecting the TCP link if no characters are received.

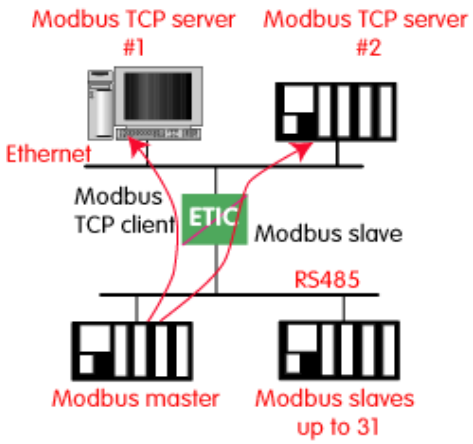
"TCP port number" parameter :

Set the port number the gateway has to use.

17.1.2 “Modbus client” gateway

That gateway can be used only if a serial modbus master device is connected to the serial interface of the XSRING.

That modbus master can send requests to slaves connected to the serial interface or to up to 256 modbus TCP servers connected to the IP network (i.e. modbus slaves).



To configure the modbus client gateway,

- select the modbus menu and then “modbus client” menu;
- enable the “modbus client” gateway and set up the parameters as follows :

“ASCII / RTU protocol” parameter :
Select the right option

“Inter-character gap” parameter :
Set up the maximum delay the gateway will have to wait between a received character of a modbus answer frame and the following character of the same frame.

"TCP inactivity Timeout" parameter :
Set the time the gateway will wait before disconnecting the TCP link if no characters are detected.

"TCP port number" parameter :
Set the TCP port number the gateway has to use.

"IP address table" :
When the serial master sends a modbus request to a slave, it includes the modbus address of that slave.
If that slave is not a serial slave but a TCP modbus server on the Ethernet network, the ETIC gateway needs to know what is its IP address.
That IP address table allows to assign an IP address to each modbus slave address.

- To assign an IP address to each modbus slave device with which the serial master device needs to communicate, click the "add a link" button; Assign an IP address in front of each modbus slave address with which the serial master device will have to communicate.

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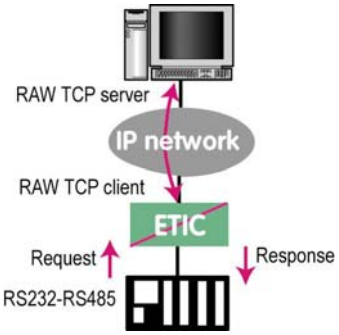
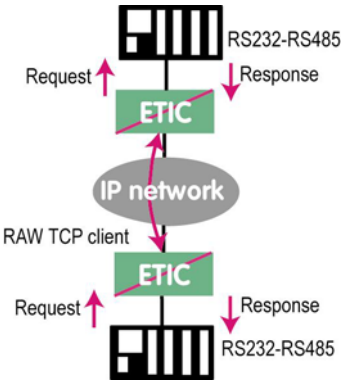
17.2 RAW TCP gateway

17.2.1 Raw client gateway

The RAW client gateway can be used if a serial “master” device has to send requests to one slave device (also called server) located on the IP network.

The server can be either an ETIC gateway or a PC including a software TCP server.





- Select the “transparent” and then the “raw client COM1” or the “raw client COM2” menu .

- Enable the raw client gateway; and set up the parameters as follows :

“RS232/485 input buffer size” parameter :
Set up the maximum length of an asynchronous string the gateway will store before transmitting it to the IP network.

“Timeout of RS232/485 end of frame” parameter :
Set up the delay the gateway will wait before declaring complete a string received from the asynchronous device.
Once declared complete, the gateway will transmit the string to the IP network.

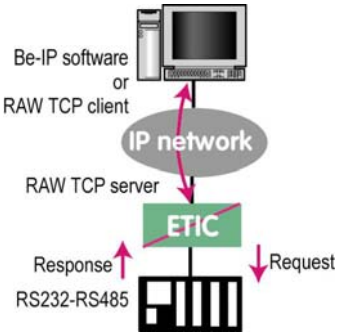
“TCP inactivity Timeout” parameter :
Set the time the gateway will wait before disconnecting the TCP link if no characters are detected.

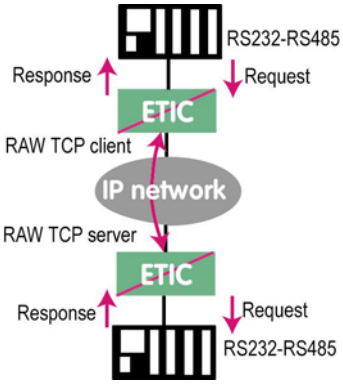
"TCP port number" parameter :
Set the port number the gateway has to use.
If the Raw TCP client gateway is assigned to both serial COM ports, the TCP port numbers must be different on each port.

"Raw server IP address" parameter :
The raw client gateway is able to communicate with a raw server gateway.
Assign an IP address to define the destination gateway.

17.2.2 Raw server gateway

That gateway can be used if a serial slave device has to answer requests coming from devices located on the IP network and acting like a master (also called TCP client).





- Select the "transparent" and then the "raw server COM1" or the "raw server COM2" menu.

- Enable the raw server gateway and set up the parameters as follows :

"RS232/485 input buffer size" parameter :
Set up the maximum length of an asynchronous string the gateway will store before transmitting it to the IP network.

"Timeout of RS232/485 end of frame" parameter :
Set up the delay the gateway will wait before declaring complete a string received from the asynchronous device.

Once declared complete, the gateway will transmit the string to the IP network.

"TCP inactivity Timeout" parameter :
Set up the time the gateway will wait before disconnecting the TCP link if no characters are detected.

"TCP port number" parameters :
Set up the port number the gateway has to use.
If the Raw TCP server gateway is assigned to both serial COM ports, the TCP port numbers must be different on each port.

17.3 RAW UDP gateway

17.3.1 Overview

The RAW UDP gateway enables you to connect together a group of serial or IP devices through an IP network.

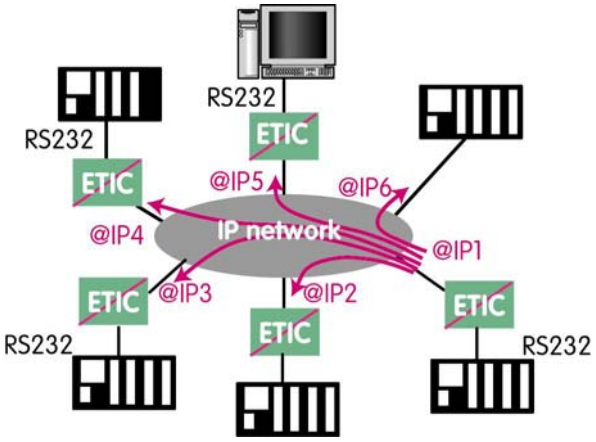
The group can include IP devices if they have the software pieces able to receive or transmit serial data inside UDP.

Serial data transmitted by each device is transmitted to all other serial devices through the IP network.

A table of IP destination gateways is stored in each IPL-E belonging to the group.

The serial data is encapsulated in the UDP protocol.

The UDP frame is sent to each destination IP address stored in the table.



17.3.2 Configuration

- Select the “gateway” menu and then the “Transparent” menu and then click “RAW UDP”.

- Select the “Activate” option.

« Serial input buffer size” **parameter** (value 1 to 1024) :
Sets the maximum size of an UDP frame.

“End of frame time-out” parameter (value 10 ms to 5 sec) :
Sets the delay the gateway will wait before sending the UDP frame towards the IP network when no characters are received from the serial interface.

«UDP port number» parameter :
Sets the UDP port number.
If the Raw UDP gateway is assigned to both serial COM ports, the UDP port numbers must be different on each port.

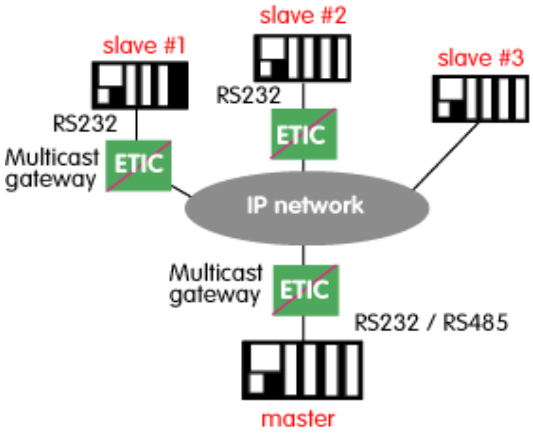
“IP addresses of the destination devices » table :
This table stores the IP addresses of the gateways to which the serial data, encapsulated inside UDP, have to be sent.
A different UDP port number can be entered for each destination IP address.

17.4 "Multicast" gateway

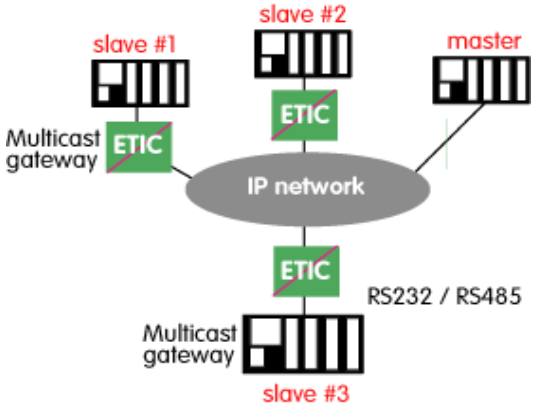
Internet Protocol multicast is a bandwidth-conserving technology that reduces traffic by simultaneously delivering a single stream of information to thousands of corporate recipients.

Thus, the multicast gateway must be used when

- a serial master device has to send requests to multiple slave devices; that devices can be IP or serial devices.



- Or when an IP master device (client) has to send requests to multiple slave devices; that devices can be IP or serial devices.



The *Internet Assigned Numbers Authority (IANA)* controls the assignment of IP multicast addresses.

The range of addresses from 224.0.1.0 through 238.255.255.255 are called “globally scoped addresses”. They can be used to multicast data between organizations and across the Internet.
The range of addresses from 239.0.0.0 through 239.255.255.255 contains limited scope addresses or administratively scoped addresses. These are defined by RFC 2365 to be constrained to a local group or organization. Routers are typically configured with filters to prevent multicast traffic in this address range from flowing outside an autonomous system (AS) or any user-defined domain. Within an autonomous system or domain, the limited scope address range can be further subdivided so those local multicast boundaries can be defined. This also allows for address reuse among these smaller domains.

Note This address range is only for the group address or destination address of IP multicast traffic. The source address for multicast datagrams is always the unicast source address.

To configure the multicast gateway,

- Select the “transparent” and then the “multicast” menus.

- Enable the multicast gateway and set up the parameters as follows :

“RS232/485 input buffer size” parameter
Set up the maximum length of an asynchronous string the gateway will store before transmitting it to the IP network.

“Timeout of RS232/485 end of frame” parameter
Set up the delay the gateway will wait before declaring complete a string received from the asynchronous device.
Once declared complete, the gateway will transmit the string to the IP network.

“TCP port” parameter
Set the port number the gateway has to use.

Multicast group IP address
Enter the multicast IP address assigned to the group with respect to the rules of the IANA authority.

17.5 « Unitelway » gateway

The unitelway gateway is made to connect an RS232-RS485 unitelway master PLC to an IP network.

- Select the Unitelway menu; select "enable the unitelway transceiver".

- Enter the XWAY address assigned to the asynchronous unitelway PLC on the IP network.

- Select « enable the IP-RS transceiver ».

- Enter the Xway address of the master PLC and, if they exist, the Xway addresses of the slave unitelway PLCs connected to the master PLC.

18 Diagnostic menu

- **Logs :**

The log displays the last 300 dated events : ethernet & shdsl connections and disconnections, power on, RS232 gateway events.

- **Network status :**

That page displays detailed information about each interface of the XSRING (SHDSL 1 & 2, ethernet, RS232-RS485).

The SHDSL paragraph shows the status of each shdsl interface :

Data rate
Connection status : Connected / connection in progress / disconnected)
Quality level of the connection from 1 to 5 : The quality level has to be at least 3.

The Show statistics button displays a page providing detailed technical information about each shdsl link quality.

- **Microswitches status** :

That screen displays the status of the microswitches located on the top of the product.

- **Ping :**

That screen enables to send a ping frame to an IP address.

IO control

That screen displays the status of the digital input and output and allows to set ON or OFF the alarm digital output.

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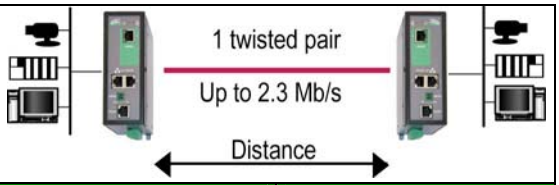
Maximum distance between 2 switches versus data rate

- 1 twisted pair (2 wires)
- Daisy chain or failsafe ring or point to point



Data rate►	128 Kb/s	1.15 Mb/s	2.3 Mb/s
▼Wire Φ			
0.9 mm	13 Km (8 miles)	8 Km (5 miles)	6 Km (3.7 miles)
0.4 mm	7 Km (4.3 miles)	4 Km (2.5 miles)	3.5 Km (2.1 miles)

Maximum distance versus data rate

- 2 twisted pair (4 wires)
- Inverse-multiplexing

Data rate►	256 Kb/s	2.3 Mb/s	4.6 Mb/s
▼Wire Φ			
0.9 mm	13 Km (8 miles)	8 Km (5 miles)	6 Km (3.7 miles)
0.4 mm	7 Km (4.3 miles)	4 Km (2.5 miles)	3.5 Km (2.1 miles)

System

Administration	To protect access to the administration server.
Target	To define the machines connected to the LAN (for QoS only)
Service list	To define the port (TCP or others) used between the machines
Date & time	To set date and time of the day
Syslog	To export the Log to a PC
Firmware update	Update the product firmware
Save / restore	To download / upload the configuration file of the product.
Reboot	To restart the product

Ethernet & switching

SHDSL port	To set the data rate over shdsl
Ethernet port	Tune the Ethernet ports
Failsafe ring	To enable and tune the failsafe ring function
VLAN	To enable VLANs per port

IP protocol & routes

IP protocol	To enter the IP @ of the unit
RIP	To enable the RIP protocol
Static routes	To enable IP routing and set the routes

Quality of service

Activate	To enable the function
Traffic classification	to assign a priority class to each TCP port and IP source @
Classes	To set the minimum bandwidth allocated to each class

Alarms	To set the alarms
SNMP	To define traps and SNMP server
IO	To defines the conditions the output will open
Email	To enter the alarm email parameters

IP to RS gateway (XSRING-2220 & 2230 only)

Modbus	To configure the modbus gateway.
Transparent	To configure the raw, multicast & telnet gateway
Unitelway	To configure the unitelway gateway

Diagnostics

Logs	To display logs
Network status	To display all the parameters of the connection in use MAC & IP @, SHDSL connection : data rate, error rate, statistics
Gateway status	To display the status of the gateway
Microswitch	To display the micro switches current position
Ping	To ping a machine
Table of routes	To display the table of routes
Ping	To ping a machine
IO control	To display the IOs status

About	To display the firmware and hardware identification

13, Chemin du Vieux Chêne
38240 Meylan France
Tel : 33 4 76 04 20 00
Fax : 33 4 76 04 20 01
E-mail : contact@etictelecom.com
Web : www.etictelecom.com